campuses in Galveston, Texas and Doha, Qatar, and operates the the Soltis Research and Education Center near the town of San Isidro, Costa Rica, the Santa Chiara Study Center in Castiglion Fiorentino, Italy, and the Texas A&M University Center in Mexico City.

**Cores:** Texas A&M supports an wide range of core facilities housing cutting-edge equipment and technological capabilities to support genetic, genomic, molecular biology and bioinformatics research and training. A list and links to core facilities supporting research in genetics can be found at (https://genomics.tamu.edu/all-texas-am-cores), and includes:

**Computational Biology**

*Texas A&M Institute for Genome Sciences and Society Bioinformatics Workspace:* Provides bioinformatics services and training. Services include a compute cluster with tailored for bioinformatics and computational biology applications. The cluster hosts a broad range of tools and software packages. The computer cluster is accessible by command line or a Galaxy interface. A free help desk is available, as well as project assistance and programming service and a BLAST server.

*AgriLife Genomics and Bioinformatics Services:* Provides bioinformatics services including consultation and experimental design, and bioinformatics analysis and processing.

*Center for Translational Environmental Health Research Genomics and Bioinformatics Facility Core:* Provides support for gene expression analysis using microarray and deep sequencing technology, including both basic and advanced analysis of expression data.

*Laboratory for Molecular Simulation:* Offers training in molecular modeling and computational chemistry. Advanced modeling software is available to perform quantum calculations on small molecular or solid systems and molecular mechanics/dynamics modeling for large systems such as proteins, DNA, nanomolecules, polymers, solids, and liquids. The LMS also provides training in Linux and support for faculty and students that wish to incorporate molecular modeling in their course material.

*Protein Folding Server:* Provides access to computational techniques to map a protein's potential landscape, and to generate transitional motions of a protein to the known native state from unstructured conformations or between user-specified conformations. Protein conformations can be submitted by PDB ids or structures can be uploaded in PDB format.
**TAMU Supercomputing Facility:** Provides access to high performance research computing resources and user support. Systems include Ada, a 17,500-core IBM NeXtScale Cluster, along with a variety of software and data storage systems.

**Molecular Biology and Genomics**

**Texas A&M Institute for Genome Sciences and Society Genomics Workspace:** Maintains shared equipment to support genomics-based research. Training and experimental support for library preparation and sequence generation including a Fluidigm Biomark HD system for high-throughput real-time or end-point PCR in nanoliter volumes, a Fluidigm C1 single-cell system for extraction and isolation of nucleic acids and template preparation for sequencing or qPCR from single cells, Bio-Rad QX200 AutoDG Droplet Digital PCR, and Illumina NextSeq 500 and MiSeq sequencers. Additional equipment available for use is an Illumina iScan, BioTek Cytation 3 Cell Imaging Microplate Reader, Bio-Rad Bio-Plex 200 for Luminex xMAP technologies, Eppendorf epMotion 5075 robot, Bio-Rad CHEF-DR II pulsed-field gel electrophoresis system, Promega Maxwell 16 for automated nucleic acids isolation, Bio-Rad CSX96 real-time PCR unit, Agilent Tape Station 2200 for nucleic acid and protein QC, Qiagen TissueLyser II, and a Miltenyi GentleMACS for tissue dissociation.

**AgriLife Genomics and Bioinformatics Services:** Provides next generation sequencing and library preparation. Equipment includes Illumina HiSeq 2000, HiSeq 2500v4, and MiSeq.

**Center for Translational Environmental Health Research Genomics and Bioinformatics Facility Core:** Provides support for gene expression experiments using microarray and deep sequencing technology, realtime RT-PCR training and access to an ABI 7900 HT, RNA quality assessment on an Agilent Bioanalyzer, and microRNA quantification by PCR array.

**AgriGenomics Core:** Provides genomics methods and expertise to faculty and students in the soil and crop community. Capabilities and equipment available include QIAzcel, and AATI, ABI3130 capillary electrophoresis systems, Kbiosciences Lite Pipeline for KASAP SNP assays, and an Accuri flow cytometer with autoloader.

**DNA Technologies Core:** Provides Sanger sequencing and a Sigma oligo distribution Center. The core focuses on DNA testing, fragment analysis and microorganism ID.
Gene Technologies Laboratory: Provides Sanger sequencing of unique DNAs, oligonucleotides, and an AutoGen 850 Alpha for DNA purification. Specialized reagents and supplies for DNA analysis are also available.

Laboratory for Genome Technology: Offers Sanger sequencing services on an ABI 3130xl and DNA fragment analysis on an ABI 377 and two LICOR instruments.

Molecular Cytogenetics and Genomics Laboratory: Performs a wide range of cytogenetic, molecular, and DNA-based testing. Services include chromosome analysis by karyotyping and FISH.

Bioseparation Lab: Provides an environment for bioprocess engineering with an emphasis in recombinant protein recovery from plant and microalgae systems. Can assist with develop novel and effective strategies for extraction and purification of recombinant and native biomolecules from plants.

Cell and Chemical Biology

Flow Cytometry Core: Provides capabilities for flow cytometry and cell sorting. Supports immunofluorescence assays, assays for DNA and cell cycle content analysis, apoptosis, cell proliferation, phagocytosis and functional expression of p-glycoprotein. Equipment includes Beckman Coulter MoFlo® Astrios™ High-Speed Cell Sorter and a Becton Dickinson FACSCalibur™ Analyzer.

Histology Laboratory: Provides paraffin and frozen sample processing, sectioning, and staining services. Many common and special histology stains are available.

Center for Translational Environmental Health Research Genomics and Bioinformatics Facility Core: Provides analysis of cellular bioenergetics with a Seahore Biosciences XF 24 Analyzer.

Laboratory for Biological Mass Spectrometry: Provides expertise in mass spectrometry methodology, instrumentation, and informatics including Electron Ionization (EI), Chemical Ionization (CI), Atmospheric Pressure Chemical Ionization (APCI), Electrospray Ionization (ESI), Matrix Assisted Laser Desorption Ionization (MALDI) and MS/MS analysis of peaks in ESI, APCI, and MALDI spectra. The services cover proteomics as well molecular-level research in various "omics" related researches, i.e., petroleomics, metabolomics, lipidomics, and glycomics. This includes analyses of compounds from small organic molecules to

**Biomolecular NMR Laboratory:** Provides access to spectrometers suited for solution-state NMR studies on biological macromolecules like proteins and nucleic acids. Instruments include a Bruker AVANCE III 800 MHz equipped with 5mm TCI cryoprobe, two Bruker AVANCE III HD spectrometers (600 MHz and a 500 MHz) and a Varian 600 MHz.

**NMR Facility:** Provides a broad array of NMR services including X-Ray Crystallography, Mass Spectrometry, and Elemental Analysis. The facility provides equipment maintenance support, user training, and spectroscopic service. Instruments include Avance 500 (500 MHz Cryoprobe system with high sensitivity for small 1H, 1H{13C} and 1H{15N} samples), NMRS 500RM (500 MHz system with 4 channels and H/F/P/C quad probe for 1H{31P}{19F}), Inova 500 (500 MHz H/C system), Inova 500B (500 MHz system with 2 RF channels, Indirect Detection probe and H/F/P/C quad probe), NMRS 500, Avance III 400 (400 MHz broadband spectrometer with sample changer), Avance 400 (400 MHz Solid State NMR with 2.5, 4, and 7 mm CP/MAS probes), Inova 400 (400 MHz system with 31P - 15N broadband probe), Inova 300 (300 MHz instrument with H/F/P/C quad probe), and Mercury 300 (300 MHz H/C system).

**X-Ray Diffraction Laboratory:** Provides full service X-ray Diffraction laboratory offering state of the art instrumentation for the analysis of solid materials. Services include single-crystal and powder diffraction for chemistry, material sciences and pharmaceuticals. Equipment includes three Bruker single-crystal APEXii CCD Diffractometers, one Bruker GADDS/Hisar dffractometer, and two Bruker powder dffractometers.

**Protein Chemistry Lab:** Provides support for advanced protein chemistry and proteomics research through state-of-the-art instrumentation, systems, software, technical expertise and training. Instruments include automated Edman protein sequence analysis, amino acid analysis, protein gel electrophoresis and electroblotting, DALTSix for large-scale 2D gels, Typhoon trio fluorescent imager, Ettan robotic systems for high-throughout picking.
digesting and spotting, high pressure liquid chromatography, MALDI-TOF MS, and electrospray MS.

Microscopy


Microscopy and Imaging Center: Provides access and training in microscopy and imaging technologies such as deconvolution of wide-field fluorescence images and correlative LM-EM. Instruments for light microscopy include Olympus FV1000 confocal microscope, Multiphoton Non-linear Optical Microscope (NLOM), Zeiss Axiophot, and Nikon Stereo Photomicroscope; for scanning electron microscopy FEI Quanta 600 FE-SEM, Tescan Vega SEM, and a Zywex S100 Nanomanipulator; and for transmission electron microscopy FEI Tecnai G2 F20 FE-TEM, FEI Tecnai G2 F20 ST FE-TEM Materials, JOEL 1200 EX TEM, and JOEL JEM-2010 TEM.

Organismal Facilities

Texas Institute for Genomic Medicine: Provides services for transgenic, knockout and embryonic stem (ES) cell manipulation in mice. Services include pronuclear injection, blastocyst injection, sperm cryopreservation, embryo cryopreservation, rederivation via IVF, embryo transfer, colony maintenance, gene targeting and access to ES-cell based gene trap libraries.

BioAquatics Facility: Provides aquatic animal facility for diverse species (fish, reptiles, amphibians, crustaceans, mollusks, and cnidarians). The Facility comprises animal holding space, laboratories, feed and storage area, and recirculating air and water supply systems.

Plant Growth Facilities: Provides twenty-two growth chambers and 12,000 sq ft of greenhouses space for transgenic and non-transgenic plants. A greenhouse annex has an additional
25,232 sq ft of greenhouse space and a 16,473 sq ft headhouse. A variety of lighting controls are available to simulate different growth conditions.

**Instrumentation**

*Biology Instrumentation Shop:* Provides research and teaching equipment repair needs. Maintains generic parts and hardware and catalog of manufacturer parts. Personnel have over 60 years combined experience on most research instrumentation including electronics, spectrophotometric, electro mechanical, vacuum, environmental control systems, refrigeration, robotics, sterilization, custom plexiglas fabrication, as well as a myriad of other basic design, repair, consulting, and planned maintenance operations.

*Chemistry Electronic Shop:* This facility will coordinate the electronics design, construction, and repairs of major instrumentation. Fuses, wire, switches and small electronic parts are available. Experience with HP printer repairs.

*Physics Electronic Shop and Parts Store:* Provides services for the engineering, design, construction, calibration, testing, and repair of a wide range of scientific & technical electronic equipment. In addition, the Electronics Shop provides a "self-service store" of over 7000 parts commonly used in scientific equipment.

*Chemistry Glass Shop:* Fabrication and repair of instructional/research glassware. Stock sizes of glass tubing, rod, ground glass joints, stopcocks, glass-metal seals, etc., are available.

*Chemistry Metal Shop:* Fabrication of instructional/research instruments and equipment; also metal bar, screws, tube and pipe fittings and brass and stainless steel are available.

*Physics Machine Shop:* Provides fabrication of prototype scientific instruments, as well as on-site inspection, estimates, consulting, machining, welding, and repairs. The Machine Shop personnel will work from a spectrum of rough sketches to CAD designs to create machined products.